88-129

WATER FACT SHEET

U.S. GEOLOGICAL SURVEY, DEPARTMENT OF THE INTERIOR

U.S. GEOLOGICAL SURVEY GROUND-WATER STUDIES IN OREGON

GROUND-WATER ISSUES

Ground water is an increasingly important natural resource in Oregon. In 1985, ground water supplied 17 percent of the total water used the State. Of all ground water used, 75 percent was for irrigation, 12 percent for rural-domestic and livestock use, 7 percent for industry, and 6 percent for public-supply. Public supplies provide ground water to about 1.6 million persons in Oregon. The use of ground water in Oregon is expected to increase owing to continued population growth and to surface-water supplies that are inadequate to meet present or future demand. The major ground-water issues in Oregon are:

- Conjunctive use of surface and ground water;
- Contamination from hazardous wastes, leakage from underground gasoline and diesel tanks, naturally occurring brackish water, and high concentrations of dissolved iron;
- Ground-water availability; and
- Indian water rights.

U. S. GEOLOGICAL SURVEY PROGRAMS

The U.S. Geological Survey (USGS), established in 1879, is the principal source of scientific and technical expertise in the earth sciences within the Federal government. USGS activities include research, quantitative investigations and data collection, and services in the fields of hydrology, geology, and cartography. The mission of the Water Resources Division of the USGS is to develop and disseminate scientific information on the Nation's water resources. The activities of the USGS in Oregon are conducted by scientists, technicians, and support staff in offices in Portland, Salem, Eugene, and Medford.

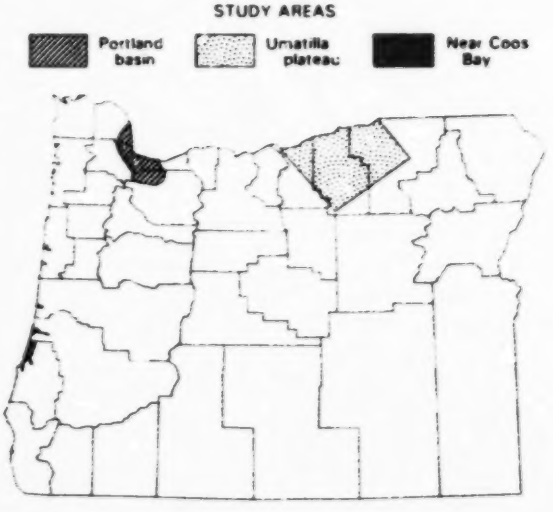
Hydrologic-data stations are maintained at selected locations throughout Oregon to record stream discharge and stage, reservoir and lake storage, ground-water levels, well and spring discharge, and the quality of surface and ground water. Water-resources data are stored in the USGS National Water Data Storage and Retrieval System data base. These data are used by water managers and planners and others involved in making decisions that affect Oregon's water resources.

Water level measurements from wells are used to determine ground-water-level trends; however, these measurements need to be integrated with other hydrologic observations and quantitative ground-water investigations to be useful to resource managers. Before 1987, the Oregon Water Resources Department, in cooperation with the USGS, maintained a network of about 400 observation wells in Oregon to monitor fluctuations in ground-water levels. Water levels currently are measured cooperatively only in active project areas.

The USGS has conducted more than 120 hydrologic investigations in Oregon. During fiscal year 1987, the USGS entered into cooperative agreements with 23 local, State, and Federal agencies to conduct hydrologic investigations in Oregon; six investigations included quantitative studies of ground water. Examples of ground-water studies conducted by the USGS to address specific ground-water issues in the State are discussed in the following sections.

Ground-Water Hydrology of the Portland basin

The city of Portland and its adjacent suburban areas constitute the largest metropolitan area in Oregon. The Portland basin hydrologic unit includes much of Clark County, Wash., which is north of Portland across the Columbia River. In recent years, a quantitative understanding of the hydrogeology of the region has become necessary because of increasing concerns over ground-water-level declines, ground-water contamination from landfills and septic tanks, and the desire by the city of Portland to develop the Portland well field near the Columbia River. In 1987, the USGS entered into cooperative agreement with the Oregon Water Resources Department (OWRD), the city of



Portland Water Bureau, and the Clark County (Washington) Intergovernmental Resources Center to collect and interpret data required to define the hydrogeology of the basin. Phase I of the study consists of defining the aquifer system, aquifer hydraulic characteristics, ground water flow directions, quantities of recharge and discharge, and distribution of ground-water pumpage. Phase II of the study will be the development and calibration of a computer model of ground-water flow for the basin. The model will be used by water managers to examine and assess the potential effects of future ground-water development in the Portland basin.

Ground-Water Hydrology in the Umatilla Plateau

Water-level declines of about 300 feet have occurred in aquifers underlying the Umatilla Plateau from 1950 to 1982. The Plateau lies mostly in Oregon, but the aquifers also extend into the Horse Heaven Hills area in Washington. The water-level declines are due principally to water withdrawals from basalt aquifers for irrigation. The USGS, in cooperation with the OWRD, has studied the ground-water system in the Umatilla Plateau. During this study, the thickness, extent, and hydraulic characteristics of three basalt aquifers were defined, recharge to the aquifers was determined, and the amount of water pumped from each aquifer was calculated. This information was used to develop a computer model of ground-water flow that was used to define the water budget, and to simulate the effects of pumping on ground-water levels from 1950 to 1982.

Iron Geochemistry of a Sand-Dune Aquifer Near Coos Bay

The city of Coos Bay-North Bend currently (1987) withdraws about 6.2 million gallons of water per day for public supply from the sand-dune aquifer north of Coos Bay and plans to increase withdrawals to as much as 30 million gallons per day in the future. From 1956 to 1977, dissolved iron in the water in the shallow part of the aquifer has increased from a maximum concentration of 9 milligrams per liter (mg/L) to a maximum of 32 mg/L. A study by the USGS in cooperation with the Coos Bay-North Bend Water Board has determined that the iron concentrations in water in the shallowest part of the aquifer are greatly increased by leachate from decaying organic matter on the floor of a lodgepole pine forest that covers about 40 percent of the sand-dune area. Water in deeper parts of the aquifer has small concentrations of dissolved iron as a result of geochemical reactions between water and minerals in marine sea shell materials in the aquifer. The geochemical reactions raise the pH of the water, which in turn causes dissolved iron to precipitate out. In addition to geochemical research at this site, the USGS developed a computer model to delineate the flow paths in the aquifer.

GROUND-WATER MANAGEMENT

The principal State agencies responsible for ground-water management in Oregon are the Oregon Water Resources Department and the Oregon Department of Environmental Quality. The Water Resources Department is responsible for collecting basic ground-water data, outlining ground-water basin resources, delineating critical ground water areas, developing and enforcing water-well standards, licensing water-well drillers and contractors, and publishing information pertaining to ground water. The Department of Environmental Quality is responsible for coordinating efforts to measure and define the quality of the State's water resources, including the development of comprehensive plans and programs for water-pollution control and solid- and hazardous-waste disposal. The Department establishes standards for the quality of water, minimum treatment and control of wastes, and operation of all waste-disposal facilities. Both agencies use ground-water data and the results of studies provided by the USGS for management of ground-water resources in the State. The following State and local agencies are, or have in the recent past, entered into cooperative cost-sharing agreements with the USGS to conduct ground-water investigations in Oregon.

City of Portland Water Bureau
Confederated Tribes of the Umatilla Indian Reservation
Confederated Tribes of the Warm Springs Indian Reservation
Coos Bay-North Bend Water Board
Intergovernmental Resources Center, Clark County, Washington
Oregon Water Resources Department

SELECTED REFERENCES

U.S. Geological Survey, 1984, National water summary, 1983—Hydrologic events and issues: U.S. Geological Survey Water-Supply Paper 2250, 243 p.

_____1985, National water summary, 1984—Hydrologic events, selected water-quality trends, and ground-water resources: U.S. Geological Survey Water-Supply Paper 2275, 467 p.

Information on technical reports and data related to ground water in Oregon can be obtained from:

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